RADIO CRACKER

A Guide To Transmitter Installation

Training Manual Supplement.

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SECTION ONE: Introduction.

This manual is designed to help you install your transmitter correctly and get the best performance from it. Throughout the document, there are various references to safety precautions *these are in italics and should be read carefully.* If at any point you're unsure as to how to proceed STOP! and seek assistance.

In this manual, we hope to answer most of the questions which might arise as you install your transmitter. Remember that your equipment must be properly installed to operate within the conditions of your broadcasting licence.

NOTE: Please keep all packaging material as this will be needed to return the transmitter, mains lead and manual at the end of the broadcast, or in case of failure.

SECTION TWO: Safety First.

Broadcast radio transmitters are full of electricity which is generally safe as long as its treated with respect and caution. Observe these rules at all times:

i) Run the transmitter off a fused mains supply, protected by a 'Residual Current Circuit Breaker' (RCCB). This is a vital piece of equipment which reduces the chances of getting an electric shock if things go wrong. It can be purchased from any good electrical shop for a few pounds. The best type to buy is a 'two pole' version which breaks both the 'live and 'neutral' wires in case of an accident.

ii) Never work on the transmitter alone, there must always be at least two people present. If something does go wrong this will mean there will be someone to help.

iii) There should be no need to remove covers from the transmitter at any time. In the unlikely event that this should prove necessary, always completely disconnect the unit from the mains supply before removing any of the covers.

iv) Always use fused plugs and follow the instructions relating to fuse ratings. Never put in a larger value fuse (this won't protect the equipment and will be dangerous).

v) Always use the earth wire where this is provided on equipment, and without exception use three wires (Earth, Neutral and Live) on extension cables and distribution boards.

vi) *Heaters (fan heaters, electric fires etc.) must be run off a completely separate supply. Never plug any heater or kettle into the sockets intended for transmission equipment. This is because they draw a lot of current and could overload the fuses protecting the transmitter.*

vii) *Always label plugs and wires clearly so that you know what each wire is connected to and which plug is providing the supply for each piece of equipment. This means that if you need to remove a piece of equipment this can be done with the minimum of fuss.*

viii) *Mains cables must only be extended by using proper connectors. Never twist wires together or use insulating tape on its own. Signal cables should also be properly insulated.*

ix) *Never leave bare wires exposed. Watch out for 'whiskers' which could short out a piece of equipment or cause an electric shock. (The tiniest wire is big enough to cause an electric shock if touched.)*

x) *Don't put cables under strain. Always leave a little spare and keep them from causing an obstruction. (Tripping over a cable can be just as dangerous as an electric shock.)*

xi) *Keep cables neat and tidy so you know where each one goes. Keep signal leads and power cables apart from each other wherever possible and don't leave any unnecessary wires around to confuse things.*

xii) *Never leave cables coiled up as they can overheat under certain circumstances. If a cable is too long and cannot be shortened, it should be carefully laid out where it will not be in the way.*

xiii) *Make sure you have proper fire extinguishers available. There should be at least two, one just inside the transmitter room and another outside it. Extinguishers should be of a type suitable for electrical fires, for example a B.C.F. (Halon gas) type. Under no circumstances should water based extinguishers be used.*

xiv) *Water and electrical equipment do not mix. Make sure that the transmitter room is dry at all times (a leaky roof could cause serious problems!). Make sure that condensation is not present as this will cause similar problems.*

SECTION THREE: Location.

The transmitter should be located indoors as close to the antenna location as possible in order to minimise the length of coaxial cable needed.

For details of antenna installation please see Tim Stanley's Technical Notes entitled 'A simple guide to engineering', sent out by Cracker Head Office recently.

If you are using an unbalanced audio feed to the transmitter, remember that ideally the studio and transmission equipment should be run from the same mains socket to minimise potential problems of mains hum on the broadcast signal. If this is not the case, it is likely that a less than optimum signal to noise ratio will have to be accepted. With any type of unbalanced audio feed, it is important to keep the audio lead as short as possible. Obviously this requirement can conflict with the need to keep the coaxial feed from the transmitter to the antenna short too. The answer is that the total distance between the studio and the transmitter musn't be too great! (Unless you're using BT land-line or a radio link in between.) Hum levels can be affected considerably by cable location, try moving the relative positions of mains and signal cables for best performance.

The transmitter location should be accessible twenty four hours per day in case emergency access is needed at any time.

Care should be taken to ensure that water cannot run down the aerial coaxial cable and reach the transmitter. The simplest method of preventing this is to ensure that the cable touches the ground just before it plugs into the back of the transmitter.

SECTION FOUR: Check list and performance description.

The transmitter takes audio from your studio and transmits this on a radio signal so that it can be received on domestic radio receivers. This process must be done within the terms of the broadcasting licence to minimise the possibility of interference being caused.

The transmitter is supplied set up to deliver a predetermined level of power to the antenna and requiring a particular level of audio in order to function properly. In addition, the unit is supplied working on the frequency allocated in your broadcast licence. An adhesive label on the front panel shows the operating frequency together with the group location.

In addition to the antenna and coaxial cable already delivered separately, the following items are supplied:

1 x FM 5 broadcast transmitter (mono or stereo)

1 x Mains lead for above

1 x Set of spare fuses

1 x Installation manual (you're reading it!)

1 x Transportation packaging.

NOTE: Please keep all packaging material as this will be needed to return the transmitter, mains lead and manual at the end of the broadcast, or in case of failure.

SECTION FIVE: Requirements.

To operate correctly, the transmitter also requires the following:

a) Mains supply 240 Volts AC +/-10% 50 Hz.

A moulded mains lead is supplied, NO OTHER SHOULD BE USED.

The mains plug fuse is rated at 1 (one) Amp. (If this needs replacing and another 1 Amp fuse cannot be found, a 3 (three) Amp version will make do.)

b) Audio input Balanced or unbalanced.

The transmitter is supplied pre-set for either balanced or unbalanced operation. If no prior requirement was specified the unit will be set for balanced operation.

Some semi-professional equipment, such as stage mixing desks, provide a peculiar non-standard type of audio output (high level, unbalanced). A suggested method of using and connecting such equipment is given at the end of this sub-section.

Where no audio requirement has been specified and set-up need to be changed, an internal adjustment will be required:

SAFETY NOTE: DO NOT remove any cover from the transmitter before completely disconnecting the unit from the mains by removing its mains input lead from the rear socket. Always replace all covers before re-connecting to the mains supply.

Inside the transmitter, a pair of pre-set 'jumpers' (one for left and one for right audio inputs)

determine the type of audio input and signal level required. Looking from the front of the transmitter, these 'jumpers' are located near the right hand side of the circuit board about three quarters of the way towards the back of the unit.

If when looking from the front of the transmitter these 'jumpers' are positioned towards the right, the unit is configured for balanced operation, requiring the XLR audio plug(s) inserted into the socket(s) on the rear of the transmitter to be wired as follows:

Pin 1 = screen, Pin 2 = live, Pin 3 = return.
Nominal peak input level = +8 dBm
Impedance = 600 Ohms,

If when looking from the front of the transmitter these 'jumpers' are positioned towards the left, the unit is configured for unbalanced operation as follows:

Pin 1 = screen, Pin 2 = live, Pin 3 = no connection.
Nominal peak input level = -10 to -20 dBm
Impedance = 10 k Ohms,

Note: Nominal peak input levels indicated above are with the rear panel 'AUDIO INPUT LEVEL' control set at a midway position between fully up and fully down. This rear panel control can be used to make final level adjustments.

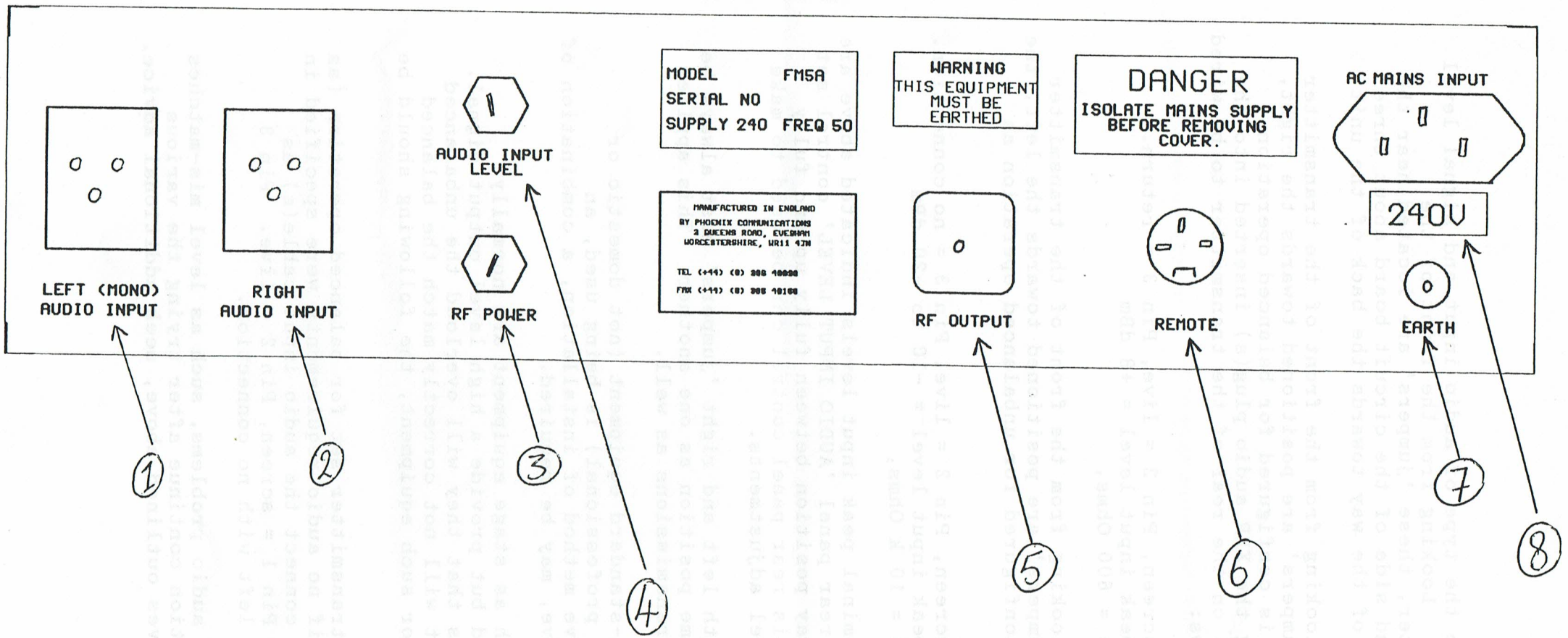
Note: Both left and right 'jumpers' must always be in the same position as one another. This applies to mono transmissions as well.

Where non-standard equipment (not domestic or broadcast professional) is being used, an alternative method of installation, a combination of those above, may be required.

Items such as stage equipment are normally unbalanced but provide a high level output signal. This means that they will overload the unbalanced input, but will not correctly match the balanced input. For such equipment, the following should be tried:

With the transmitter set for balanced operation (as supplied if no audio requirements were specified in advance), connect the audio input cable(s) as follows - Pin 1 = screen, Pin 2 = live. Pin 3 should be left with no connection.

NOTE: If audio problems, such as level mis-matches or distortion continue after trying the various alternatives outlined above, seek additional advice.


MODEL FM5A
SERIAL NO
SUPPLY 240 FREQ 50
MANUFACTURED IN ENGLAND
BY PHOENIX COMMUNICATIONS
2 QUEENS ROAD, EVESHAM
WORCESTERSHIRE, WR11 4JN
TEL (+44) (0) 386 40000
FAX (+44) (0) 386 40100
WARNING
THIS EQUIPMENT MUST BE EARTHED
DANGER
ISOLATE MAINS SUPPLY BEFORE REMOVING COVER.
AC MAINS INPUT
240V
LEFT (MONO) AUDIO INPUT
RIGHT AUDIO INPUT
AUDIO INPUT LEVEL
RF POWER
RF OUTPUT
REMOTE
EARTH
1
2
3
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5
6
7
8

c) Antenna Band II broad-band.

The antenna supplied with the transmitter is a broad-band design which requires no adjustment.

(For guidance on installation, please see Tim Stanley's Technical Notes and listen to the Engineering Seminar cassette supplied by Cracker Head Office. *REMEMBER: Antenna installation must be carried out by a suitably qualified person.*)

SECTION SIX: Rear panel description (refer to diagram).

The rear panel controls and connectors are numbered on the accompanying diagram as follows:

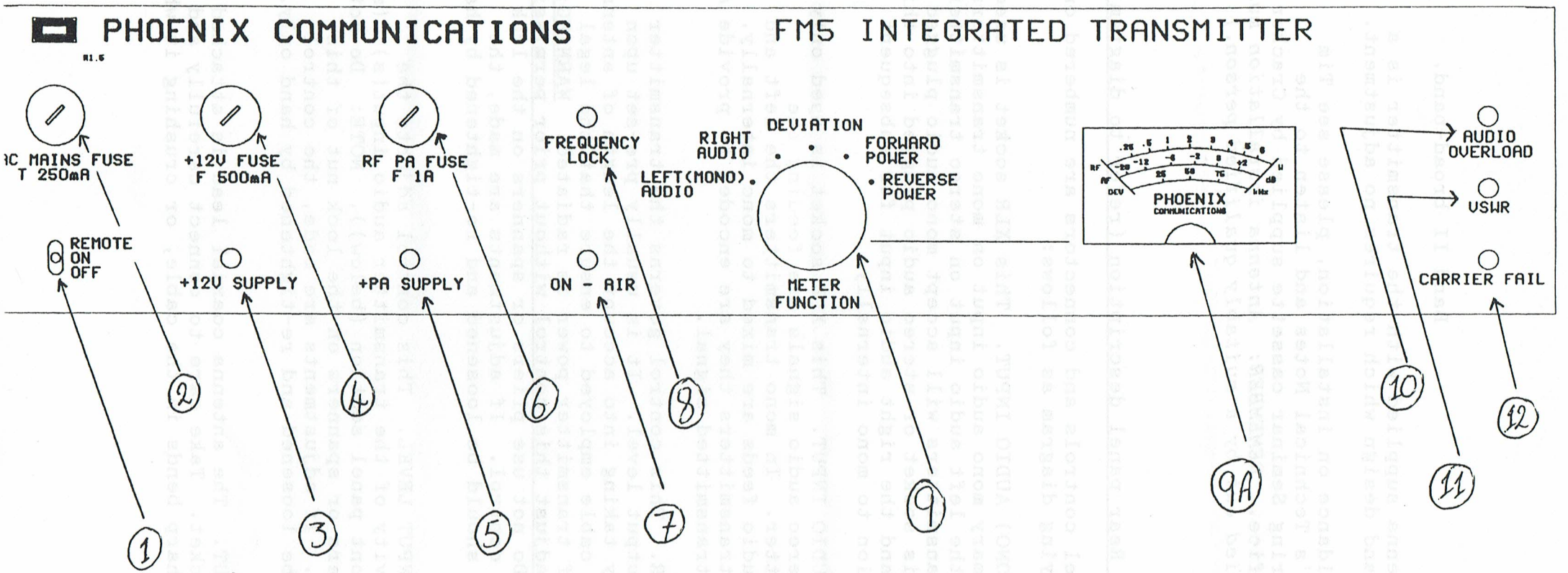
1) LEFT (MONO) AUDIO INPUT. This XLR socket is used as the primary mono audio input on mono transmitters and as the left audio input on stereo transmitters. Mono transmitters will accept mono audio plugged into this socket or stereo audio plugged into this socket and the right audio input for subsequent conversion to mono internally.

2) RIGHT AUDIO INPUT. This XLR socket is used only when stereo audio signals are feeding the transmitter. In mono transmitters the left and right audio feeds are mixed to mono internally. In stereo transmitters they are encoded to provide a stereo transmitted signal.

3) RF POWER. This control governs the transmitter power output level. It is usually pre-set upon delivery taking into account the length of antenna coaxial cable employed to ensure that the legal limit of transmitter power is radiated. **WARNING: Do not adjust this control without prior permission.** NOTE: Do not use pliers or spanners on the lock nut of this control. If adjustments are made, the control should be loosened and re-tightened by hand only.

4) AUDIO INPUT LEVEL. This control adjusts the sensitivity of the transmitter audio input(s), (see also front panel section (below)). NOTE: Do not use pliers or spanners on the lock nut of this control. If adjustments are made, the control should be loosened and re-tightened by hand only.

5) RF OUTPUT. The antenna coaxial lead is attached to this socket. Take care to connect carefully and avoid sharp bends in the cable, or crushing it which


PHOENIX COMMUNICATIONS
FM5 INTEGRATED TRANSMITTER
R1.6
AC MAINS FUSE
T 250mA
+12V FUSE
F 500mA
RF PA FUSE
F 1A
FREQUENCY
LOCK
RIGHT
AUDIO
DEVIATION
FORWARD
POWER
LEFT(MONO)
AUDIO
REVERSE
POWER
AUDIO
OVERLOAD
VSWR
CARRIER FAIL
REMOTE
ON
OFF
+12V SUPPLY
+PA SUPPLY
ON - AIR
METER
FUNCTION
PHOENIX
COMMUNICATIONS
1
2
3
4
5
6
7
8
9
9A
10
11
12

will cause damage and affect the performance of the transmitter.

6) REMOTE switching. This 3 pin DIN socket provides for remote operation of the transmitter. Looking from behind the transmitter, the pin on the left and pin located at the top are used to perform this function. With nothing connected to these pins, the transmitter will operate with the front panel 'REMOTE/ON/OFF' in the 'REMOTE' position in the same way as if the switch were in the 'ON' position. If however these two pins are shorted together the transmitter will perform as if the front panel 'REMOTE/ON/OFF' switch were in the 'OFF' position (ie in standby mode). The third pin of this socket, on the right hand side looking from behind the transmitter, provides a low current regulated 12 volt supply. **WARNING: This facility should not be used without prior permission.**

7) EARTH. *SAFETY NOTE: This is a very important safety feature. The transmitter installation should be checked over by a qualified electrician to ensure that safety standards are maintained.*

8) AC MAINS INPUT. Using the moulded cable provided this socket is used to connect the transmitter into the mains supply. *SAFETY NOTE: Check that any extension leads used are three core and properly earthed.*

SECTION SEVEN: Front Panel description (refer to dia.).

The front panel controls and indicators are numbered on the accompanying diagram as follows:

1) REMOTE/ON/OFF switch. Used to turn the transmitter on and off.

In the 'OFF' position the transmitter will be in standby mode. All green LED indicators except 'ON-AIR' will illuminate (the 'FREQUENCY LOCK' indicator can take up to 30 seconds to illuminate from the time at which the transmitter is plugged into the mains). In this mode the transmitter is not broadcasting although by holding a radio tuned to the operating frequency close by it may be picked up if audio is being put through it. In this mode the red LED indicating 'CARRIER FAIL' will be illuminated to show that transmissions are not under way.

In the 'ON' position this switch will put the transmitter on-air. All green LED indicators should

be illuminated and all red fault LED indicators should be off.

In the 'REMOTE' position, contacts on the rear panel three pin DIN plug labelled 'REMOTE' are used to turn the transmitter on and off. (See also Rear Panel section (above).)

2) AC MAINS FUSE T 630 mA. **(PLEASE NOTE: This fuse is wrongly described on the front panel as being rated at T 250 mA.)** An additional mains inlet fuse which protects the whole transmitter. The initial 'T' in the fuse rating (T 630 mA) means that the fuse used must be an anti-surge type (NOT fast acting). The current handling capacity of this fuse, according to the front panel legend, is 250 milliamps but a T 630 mA version, is actually employed with a back-up supplied in the spare fuse selection. *NOTE: Take care not to use the spare F 500 mA fuse also supplied spare for use in the '+12 V Supply' fuse holder. NOTE: Do not use fuses with a higher current rating. The transmitter will not be properly protected, could be dangerous and may be damaged.*

3) +12 V SUPPLY green LED. Used to indicate that the internal 12 Volt supply in the transmitter is functioning normally. This indicator will not illuminate if the '+12 V FUSE' (number 4 on the diagram) is missing or broken.

4) +12 V FUSE F 500 mA. This fuse protects the +12 V internal supply of the transmitter. The '+12 V SUPPLY' indicator (number 3 on diagram) will not illuminate if this fuse is missing or broken. The initial 'F' in the fuse rating (F 500 mA) indicates that the fuse used must be a fast acting type (NOT anti-surge). The current handling capacity of this fuse is 500 milliamps. *NOTE: Do not use fuses with a higher current rating. The transmitter will not be properly protected, could be dangerous and may be damaged.*

5) +PA SUPPLY green LED. Used to indicate that the internal supply to the high power sections of the transmitter is functioning normally. This indicator will not illuminate if the 'RF PA FUSE' (number 6 on the diagram) is missing or broken.

6) RF PA FUSE F 1 A. This fuse protects the internal supply of the transmitter to its high power stages. The '+PA SUPPLY' indicator (number 5 on diagram) will not illuminate if this fuse is missing or broken. The initial 'F' in the fuse rating (F 1 A) indicates that the fuse used must be a fast acting type (NOT anti-surge). The current handling capacity of this fuse is 1 Amp. *NOTE: Do not use fuses with a higher current rating. The transmitter*

will not be properly protected, could be dangerous and may be damaged.

7) ON-AIR green LED. When illuminated, this indicator denotes that the transmitter is broadcasting. If the 'REMOTE/ON/OFF' switch (labelled 1 on the diagram) is in the 'OFF' position or in the 'REMOTE' position with control contacts on the rear panel closed this indicator will not illuminate. (See rear panel section for further details of remote operation.)

8) FREQUENCY LOCK green LED. This indicator illuminates when the transmitter is operating on the correct frequency. Because the unit checks itself when power is first applied this indicator can take up to thirty seconds to illuminate.

9) METER FUNCTION rotary switch. Used in conjunction with the 'FRONT PANEL METER' (9 A in diagram) to check various transmitter functions. These are: left (mono) audio; right audio; deviation; forward power; reverse power.

9 A) FRONT PANEL METER. Used in conjunction with the front panel meter function rotary switch (9 in diagram). Three ranges, RF, AF and DEV are shown. For each of the transmitter functions which can be monitored the following readings apply:

LEFT MONO AUDIO. If set up on programme material the maximum level indicated on the AF scale should be -2 dB. If set up on static tone from a mixer, the maximum level indicated on the AF scale should be 0 dB. Adjustment of audio input levels is achieved by altering the position of the 'AUDIO INPUT LEVEL' control on the rear panel. This position is used to check audio inputs on mono transmitters as well as checking the left channel input on stereo versions. All audio line up should be done with the mixer sending at peak level.

RIGHT AUDIO. Used to check right channel of stereo transmitters. If set up on programme material the maximum level indicated on the AF scale should be -2 dB. If set up on static tone from a mixer, the maximum level indicated on the AF scale should be 0 dB. Adjustment of audio input levels is achieved by altering the position of the 'AUDIO INPUT LEVEL' control on the rear panel. This position has no function on mono transmitters. All audio line up should be done with the mixer sending at peak level.

DEVIATION. Used as a check to confirm audio level settings. Under normal programme conditions the meter should show around 25 on the kHz scale. Static tone should indicate about 60 on the same scale. (NB. The low reading under programme

conditions is caused by slow meter action, it does not mean that deviation is only 25 kHz.)

FORWARD POWER When switched to this position, the meter indicates the transmitter power output in Watts on the top scale marked 'W'. **PLEASE NOTE:** Your transmitter has been set to a power output level with accurate workshop test equipment. The 'FORWARD POWER' metering in the FM 5 transmitter can be a few percent out, so don't worry if according to the meter your transmitter power isn't exactly right!

Because power is absorbed by the feeder cable to the antenna, the transmitter output power should be set in accordance with the following table:

10 metres of coaxial cable	1.2 Watts
20 metres of coaxial cable	1.4 Watts
30 metres of coaxial cable	1.6 Watts
40 metres of coaxial cable	1.9 Watts
50 metres of coaxial cable	2.2 Watts
60 metres of coaxial cable	2.6 Watts

REVERSE POWER. When switched to this position, the meter indicates the amount of power reflected by the antenna back down the coaxial feed into the transmitter. The meter reading when switched to this position should be very low, virtually not moving in fact. A poorly installed antenna will cause more power to be reflected back into the transmitter, thereby reducing the amount of signal broadcast and reducing coverage. If a great deal of reflected power is present, the transmitter could be damaged, and the red 'VSWR' LED will illuminate (see also sub-section 11 (below)).

10) AUDIO OVERLOAD. This red LED indicates that audio input levels are much too high and should therefore not normally illuminate. If however the occasional flicker (once or twice a minute) is seen this is not something to worry about. If the indicator becomes brightly illuminated or flickers regularly the metering system (9 and 9 A on diagram) should be used to check audio input levels are correct. This LED operates when the peak audio input to the transmitter is exceeded by about 13dB. Unlike the front panel meter it will respond to show peaks of audio signal.

Severe distortion will be present at audio levels of 16dB above peak and greater (when the 'AUDIO OVERLOAD' LED will be brightly illuminated). This extra 16dB between normal peak level and the onset of serious distortion provides a 'guard-band' which allows DJs to occasionally make mistakes with their levels and get away with it. An audio limiter is built into the transmitter which maintains the peak

deviation at 75 kHz even under these circumstances. For real tech freaks, the limiter threshold point is 8dB below normal peak level and the input amplifier clips at about 16dB above normal peak level. If the audio input level lies between these values, the limiter will unobtrusively control the peak deviation.

Because the transmitter is fitted with an internal limiter, it is not normally a good idea to employ any external gain control equipment, so be careful if you are thinking of doing so. In particular, remember to test the performance of the system with a variety of programme material. In the vast majority of cases, the best performance will be obtained when no additional equipment is used.

11) VSWR. This red LED should never illuminate at all. If it does there is an antenna fault which must be corrected immediately. Please refer to Tim Stanley's Technical Notes to check antenna installation has been carried out correctly. If no adjustments to antenna installation appear to be required and the problem persists, seek immediate technical assistance. This LED illuminates if the antenna VSWR is more than about 3:1.

12) CARRIER FAIL. This red LED indicates that the transmitter is not broadcasting. Before assuming a fault, check that the 'REMOTE/ON/OFF' switch is in the 'ON' position, or in the 'remote' position with the control contacts open (see also Rear Panel section (above)). If using remote and this LED illuminates when the transmitter is supposed to be broadcasting, switch 'REMOTE/ON/OFF' switch to the 'ON' position to over-ride the remote. If this action causes the 'CARRIER FAIL' LED to go out, the fault lies in the operation of the remote control equipment. If after testing in this manner LED is still illuminated, seek further technical assistance. (NB. when power is first applied to the transmitter this LED will illuminate until the green 'FREQUENCY LOCK' LED comes on.) This LED illuminates to indicate that transmitter output power has dropped to below about half a Watt.

SECTION EIGHT: Installation.

a) Connect the antenna lead to the transmitter,making sure the plug is properly screwed in. *Connect the 'EARTH'.*

b) Connect the audio lead from the studio, making sure no audio is present at this stage.

c) Plug in the mains lead, without turning on the power at this stage and making sure the transmitter front panel control switch is in the 'off' position.

d) Check all connections, *including the 'EARTH'*.

SECTION NINE: Switching on.

a) Turn on the mains supply

b) Switch on the transmitter by means of the front panel control switch

Note: The transmitter will not switch on immediately there will usually be a delay of up to 30 seconds whilst the unit checks its operational frequency is correct.

c) Once the 'ON AIR' green LED has illuminated, check the red 'CARRIER FAIL' and 'VSWR' LED indicators are not illuminated. (If either are, refer to 'Front Panel' section (above).

d) Check all green LED indicators are illuminated (If any are not, refer to 'Front Panel' section (above).

e) Supply audio from studio (this should be high quality, for example off CD). DO NOT use cassette tapes or scratchy records for testing.

f) Check meter readings for:

(i) Audio Input level
(ii) Forward power
(iii)Reverse
(iv) Deviation

These readings should all be within the limits specified in the 'front panel' section (above).

g) MOST IMPORTANT! Listen to it!!!!

For tips on good reception of your transmission, please see Tim Stanley's Technical Notes (Number 2) previously supplied by Cracker Head Office.

SECTION TEN: Interference.

By their very nature, broadcast transmitters can easily cause interference even if properly set-up. Very often this is not the fault of the transmitter itself but

happens because outside equipment has poor resistance to external signals!

The first thing to say about interference complaints is that, whatever the person who complains says, you should be polite and courteous in your dealings with them. Being helpful is always the best policy!

There are various types of interference, the main types of which may be summarised as follows (a portable radio will help identify what is going on in most cases):

i) Overload - If the radio goes 'dead' or there is white noise (hissing) over the received signal, these are generally a sign of receiver overload. This means that the radio is picking up too much signal and its circuitry is being swamped. This is most likely to occur in the studio or very close to the transmitter. Possible solution - shorten telescopic aerial of receiver or move external receive aerial further away from the transmitter antenna. If the radio affected is only being used to pick up the station itself and no other signals, try fully retracting the telescopic aerial, or removing any external aerial completely.

ii) Inter-modulation products - If the radio picks up 'rogue' signals with two or more sets of audio (ie programme material) on the same frequency, this indicates the presence of inter-modulation products.

There are, in general, two types of inter-modulation products, those created within the receiver and those created within the transmitter. Those created within the receiver are the most common and are caused as a result of overload (see section (i) (above) for possible solution). Transmitter inter-modulation products are generally less common, but more difficult to eliminate. These are caused as a result of the presence of other high power radio signals getting into the transmitter and affecting its performance. The most likely cause is other radio transmitters located close by. NOTE: There is no easy way of telling the difference between types of inter-modulation product.

iii) TVI (television interference) - This (and overload of nearby FM receivers, see sub-section (i) (above)) is the most likely cause of complaints from the public. To minimise the possibility of this occurring, keep the transmitter antennae as far away from any TV aerial as possible (this is particularly important near TV aerials which pick up signals for distribution on cable systems which are notoriously prone to problems of interference, often because of poor installation or simply the fact that they are old). Possible solution - If despite careful positioning of the transmitter antenna TVI still

occurs it may be possible to correct specific problems by fitting a 'braid breaker' in the TV aerial down lead before it plugs into the TV or video affected. These are available from good TV and aerial installation companies for a few pounds. They can also be obtained by post from Cirkit Components in Hertfordshire (telephone 0992-444111).

SECTION ELEVEN: Common faults

A number of common faults can occur in a transmitter installation. If the equipment does not appear to be functioning it is important not to assume that there is an internal fault. It is most likely that set-up has not been carried out correctly or that external factors are causing the problem.

Most likely sources of problems are:

a) Faulty or missing connections.
b) Poor antenna installation.
c) Lack of mains supply (transmitter unplugged?).
d) Incorrect or missing audio feed(plugged in correctly at both ends?).
e) 'REMOTE/ON/OFF' switch in wrong position.
f) 'REMOTE' connection (if used) wrongly wired.
g) Rear panel audio level control wrongly adjusted.
h) Internal audio 'jumpers' wrongly set.
i) Rear panel RF output control wrongly adjusted.
j) Fuse(s) blown (on transmitter or building fuse box) (Buildings may also use circuit breakers which should be checked.).
k) RCCB not set correctly (follow its test procedure).
l) Studio hum caused in mixer or other part of studio (check to see if its still there with transmitter turned off).
m) Studio hum caused by transmitter. If hum does disappear when transmitter is turned off, it is likely that the transmitter is the source of the problem. RF interference may be getting into the studio back down the audio feed to the transmitter. Try putting ferrite beads on the live (and return in balanced systems) lead, but not on the screen lead. Also try wrapping part of audio lead around a ferrite rod or large ring, as near to the mixer output as possible. Suitable components can be obtained by post from Cirkit Components in Hertfordshire (telephone 0992-444111) or a good local electronics shop.

n) In many cases the procedure outlines in (m) (above) will need to be repeated on the various audio inputs of the mixer too.

n) Make sure the receiver being used is working properly, with a suitable aerial if appropriate, and is tuned to the correct frequency.

o) Check for presence of problem on a different model of radio (the receiver could be at fault).

Note: Having tried the relevant sections of the above list, before assuming a transmitter fault or calling for outside assistance, also use the following procedure:

i) Carefully check all rear panel connections.

ii) Check the status of antenna installation, mains supply and audio feed from studio.

iii) With the transmitter switched on ('REMOTE/ON/OFF' front panel switch in the 'ON' position) with a mains supply properly connected, check the status of the front panel indicators. If any red LED is illuminated refer to relevant front panel sub-section (above) and take corrective action. If any green LED fails to illuminate, refer to relevant front panel sub-section (above) and take corrective action.

iv) If all connections are correct, front and rear panel controls are properly adjusted and all green status LED indicators are correctly illuminated (and no red ones are) there should be no fault present.

Having carefully checked through all the above, if the unit still appears not to be working, follow the call-out procedure detailed in Tim Stanley's Technical Notes number III, to be supplied shortly.

NOTE: UNDER NO CIRCUMSTANCES SHOULD ANY INTERNAL REPAIR OF THE UNIT BE ATTEMPTED. DO NOT ADJUST THE TRANSMITTER INTERNALLY WITH COVERS REMOVED UNLESS YOU HAVE FIRST DISCONNECTED THE UNIT FROM THE MAINS SUPPLY COMPLETELY. ALWAYS REPLACE ALL COVERS PROPERLY BEFORE RE-CONNECTING.

NOTE: The resources of the emergency call out team are very limited since they have to deal with nearly 100 stations all across the country. Please make sure that you take every reasonable step to avoid calling them out unnecessarily. Doing so will mean that they have more time to help groups with a genuine problem.